We claim:

1.   Apparatus for increasing the sensitivity of measuring the amount of radioactive

material in waste <u>utilizing localized neutron coincidence vetoes to reduce</u> ~~by reducing~~

the interference caused by cosmic ray generated neutrons, said apparatus comprising:

    a)   a plurality of neutron detectors, each of said detectors including means for

          generating a pulse in response to the detection of a neutron; and

    b)   means, coupled to each of said neutron detectors, for counting only some of

          said pulses from each of said detectors, whether cosmic ray or fission

          generated, said means for counting including ~~a~~ means that, after counting one

          of said pulses <u>from a given one said detectors</u>, vetos the counting of additional

          ones of said pulses for a prescribed period of time <u>from said given one of said</u>

          <u>detectors without vetoing all of said pulses from all of said detectors.</u>.

2.   The apparatus of claim 1, wherein said prescribed period of time is between 50 and

200 μs .

3.   The apparatus of claim 2, wherein said prescribed period of time is 128μs.

4.   The apparatus of claim 1, wherein said veto means is an electronic circuit.

5.   The apparatus of claim ~~5~~<u>4</u>, wherein said veto means includes a leading edge pulse

generator which passes said one of said pulses but blocks any subsequent pulse <u>from</u>

<u>said given one of said detectors</u> for a period of between 50 and 200μs.

6.   The apparatus of claim 1, wherein said veto means is a software program.

7.   The apparatus of claim 6, wherein said software program includes means for tagging each of said pulses from each of said detectors for both time and position, means for counting one of said pulses from a particular position, and means for rejecting those of said pulses which originate from said particular position and in a time interval on the order of the neutron die-away time in polyethylene or other suitable material.

8.   The apparatus of claim 1, wherein said neutron detectors are grouped in pods.

9.   The apparatus of claim 8, further including a plurality of means for counting and a like plurality of veto means, and wherein all said detectors included in a particular one ~~each~~ of said pods are coupled to a one of said plurality of means for counting and to one of said veto means, said veto means vetoing said counting of said additional ones ~~one~~ of said pulses from all of said detectors included in said pod

10. The apparatus of claim 9, further including means for vetoing said counting of said additional ones of said pulses from all of said detectors included in each of said pods which are adjacent to said pod which includes said detector which produced said pulse which was counted.

11. The apparatus of claim 8, wherein there are at least 10 of said pods.

12. The apparatus of claim 1, wherein said detectors are supported by a layer of material which shields said waste from neutrons generated outside of said layer.

13. The apparatus of claim 1, further including means for disabling said veto means for high counting rates.

14. A method for increasing the sensitivity of measuring the amount of radioactivity in waste utilizing localized neutron coincidence vetoes to reduce the interference caused by

cosmic ray generated neutrons, said method including the steps of:

a) providing a plurality of neutron detectors, ~~each of said detectors including~~

5 ~~means for generating a pulse in response to the detection of a neutron~~;

b) generating pulses from each of said neutron detectors in response to the detection of neutrons by each said neutron detector, each of said pulses corresponding to the detection of a neutron;

c) ~~b)~~ for each neutron detector counting one ~~only some~~ of said pulses ~~from each of~~

10 ~~said detectors, whether cosmic ray or fission generated~~; and

c) for each of said neutron detectors, after said counting of said one of said pulses, vetoing the counting of additional ones of said pulses ~~from each of said detectors~~ for a prescribed period of time ~~after said counting~~.

15. The method of claim 14 wherein said prescribed period of time is between 50 and 200μs.

16. The method of claim 14, wherein after said counting of said one of said pulses, also vetoing the counting of additional ones of said pulses for said prescribed period of time from detectors adjust to said detector for which said pulse was counted.

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